

THE CLAIMS

What is claimed:

1. A bone plate having a longitudinal axis and comprising:
an upper surface;
5 a lower surface;
at least one first type of hole, the first type of hole being elongated and extending through the upper and lower surfaces, and having a central axis and a longitudinal axis, wherein the first type of hole includes a threaded portion and a non-threaded portion, and the threaded portion extends through an angle of between about 190° and about 280°
10 with respect to the central axis; and
at least a second type of hole extending through the upper and lower surfaces, the second type of hole including an internal thread configured and dimensioned for engaging a threaded portion of a screw head.
2. The bone plate of claim 1, wherein the plate comprises a plurality of holes of the first
15 type and a plurality of holes of the second type.
3. The bone plate of claim 2, wherein the plurality of holes of the first type are located closer to a first end of the plate and the plurality of holes of the second type are located closer to a second end of the plate.
4. The bone plate of claim 1, wherein the longitudinal axis of at least one of the first type of
20 hole is substantially aligned with the longitudinal axis of the plate.
5. The bone plate of claim 1, wherein the second type of hole has an outer perimeter that is substantially circular.
6. The bone plate of claim 5, wherein the second type of hole is conically tapered inward from the upper surface towards the lower surface of the plate.
- 25 7. The bone plate of claim 6, wherein the second type of hole conically tapers at a cone angle of between about 5° and about 20°.

8. The bone plate of claim 6, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole is substantially non-threaded.

9. The bone plate of claim 8, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a plurality of holes of at least the second type are located closer to a second end of the plate.

10. The bone plate of claim 5, wherein the second type of hole has a first opening on the upper surface of the bone plate and a second opening on the bottom surface of the bone plate, and the first and second openings have substantially the same dimensions.

11. The bone plate of claim 10, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole is substantially non-threaded.

12. The bone plate of claim 11, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a plurality of holes of at least the second type are located closer to a second end of the plate.

13. The bone plate of claim 1, wherein the threaded portion of the first type of hole extends through an angle of between about 200° and about 250° with respect to the central axis.

14. The bone plate of claim 1, wherein:

the threaded portion of the first type of hole extends through a first angle at the upper surface;

the threaded portion of the first type of hole extends through a second angle at the lower surface; and

the first angle is larger than the second angle.

15. The bone plate of claim 14, wherein the first angle is between about 200° and about 270°, and the second angle is between about 180° and about 230°.

16. The bone plate of claim 1, wherein the first type of hole has first and second ends spaced apart along the longitudinal axis, and the threaded portion is disposed adjacent one of the ends.

17. The bone plate of claim 1, wherein the threaded portion of the first type of hole is located closer to a central portion of the bone plate than to an end portion of the bone plate.

18. The bone plate of claim 1, wherein the non-threaded portion of the first type of hole is configured and dimensioned to engage a substantially spherical screw head and provide
5 compression of fractured bone fragments.

19. The bone plate of claim 18, further including a screw having a head, wherein the screw head is substantially smooth.

20. The bone plate of claim 18, further including a screw having a head, wherein the screw head is at least partially threaded.

10 21. The bone plate of claim 1, wherein the non-threaded portion of the first type of hole includes a concave recessed portion in the upper surface.

22. The bone plate of claim 21, wherein the recessed portion is substantially spherical.

23. The bone plate of claim 1, wherein:
the first type of hole has a first dimension on the lower surface that is
15 substantially parallel to the longitudinal axis;
the first type of hole has a second dimension on the lower surface that is substantially perpendicular to the longitudinal axis; and
the first dimension is between 1.1 and 3 times larger than the second dimension.

20 24. The bone plate of claim 1, wherein the threaded portion of the first type of hole tapers inward in a direction from the upper surface towards the lower surface.

25. The bone plate of claim 1, wherein at least a portion of the non-threaded portion of the first type of hole tapers inward from the upper surface to the lower surface to form at least one ramp surface for engagement with a screw head.

25 26. The bone plate of claim 25, wherein the ramp surface is located on one end of the first type of hole to provide compression in a single direction.

27. A bone plate having a longitudinal axis and comprising:

an upper surface;

a lower surface;

at least one first type of hole, the first type of hole being elongated and

5 extending through the upper and lower surfaces, and having a central axis and a longitudinal axis, wherein the first type of hole includes a threaded portion and a non-threaded portion, and the threaded portion extends through an angle of between about 190° and about 280° with respect to the central axis; and

10 at least a second type of hole extending through the upper and lower surfaces, wherein the second type of hole is substantially non-threaded.

28. The bone plate of claim 27, wherein the plate comprises a plurality of holes of the first type and a plurality of holes of the second type.

29. The bone plate of claim 28, wherein the plurality of holes of the first type are located closer to a first end of the plate and the plurality of holes of the second type are located
15 closer to a second end of the plate.

30. The bone plate of claim 27, wherein the longitudinal axis of at least one of the first type of hole is substantially aligned with the longitudinal axis of the plate.

31. The bone plate of claim 27, wherein the second type of hole has an outer perimeter that is substantially circular.

20 32. The bone plate of claim 31, wherein the second type of hole is conically tapered inward from the upper surface towards the lower surface of the plate.

33. The bone plate of claim 32, wherein the second type of hole conically tapers at a cone angle of between about 5° and about 20°.

25 34. The bone plate of claim 32, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole includes an internal thread configured and dimensioned for engaging a threaded portion of a screw head.

35. The bone plate of claim 34, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a plurality of holes of at least the third type are located closer to a second end of the plate.
36. The bone plate of claim 31, wherein the second type of hole has a first opening on the upper surface of the bone plate and a second opening on the bottom surface of the bone plate, and the first and second openings have substantially the same dimensions.
37. The bone plate of claim 36, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole includes an internal thread configured and dimensioned for engaging a threaded portion of a screw head.
38. The bone plate of claim 37, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a plurality of holes of at least the third type are located closer to a second end of the plate.
39. The bone plate of claim 27, wherein the threaded portion of the first type of hole extends through an angle of between about 200° and about 250° with respect to the central axis.
40. The bone plate of claim 27, wherein:
the threaded portion of the first type of hole extends through a first angle at the upper surface;
the threaded portion of the first type of hole extends through a second angle at the lower surface; and
the first angle is larger than the second angle.
41. The bone plate of claim 40, wherein the first angle is between about 200° and about 270°, and the second angle is between about 180° and about 230°.
42. The bone plate of claim 27, wherein the first type of hole has first and second ends spaced apart along the longitudinal axis, and the threaded portion is disposed adjacent one of the ends.
43. The bone plate of claim 27, wherein the threaded portion of the first type of hole is located closer to a central portion of the bone plate than to an end portion of the bone plate.

44. The bone plate of claim 27, wherein the non-threaded portion of the first type of hole is configured and dimensioned to engage a substantially spherical screw head and provide compression of fractured bone fragments.

5 45. The bone plate of claim 44, further including a screw having a head, wherein the screw head is substantially smooth.

46. The bone plate of claim 44, further including a screw having a head, wherein the screw head is at least partially threaded.

47. The bone plate of claim 27, wherein the non-threaded portion of the first type of hole includes a concave recessed portion in the upper surface.

10 48. The bone plate of claim 47, wherein the recessed portion is substantially spherical.

49. The bone plate of claim 27, wherein:

the first type of hole has a first dimension on the lower surface that is substantially parallel to the longitudinal axis;

15 the first type of hole has a second dimension on the lower surface that is substantially perpendicular to the longitudinal axis; and

the first dimension is between 1.1 and 3 times larger than the second dimension.

50. The bone plate of claim 27, wherein the threaded portion of the first type of hole tapers inward in a direction from the upper surface towards the lower surface.

20 51. The bone plate of claim 27, wherein at least a portion of the non-threaded portion of the first type of hole tapers inward from the upper surface to the lower surface to form at least one ramp surface for engagement with a screw head.

52. The bone plate of claim 51, wherein the ramp surface is located on one end of the first type of hole to provide compression in a single direction.

25 53. A bone plate having a longitudinal axis and comprising:

an upper surface;

a lower surface;

at least one first type of hole, the first type of hole being elongated and extending through the upper and lower surfaces, and having a central axis and a longitudinal axis, wherein the first type of hole is non-threaded and has an outer perimeter, at least a portion of the outer perimeter tapering inward from the upper surface to the lower surface to form at least one ramp surface for engagement with a first screw head; and

at least a second type of hole extending through the upper and lower surfaces, the second type of hole including an internal thread configured and dimensioned for engaging a threaded portion of a second screw head.

54. The bone plate of claim 53, wherein the plate comprises a plurality of holes of the first type and a plurality of holes of the second type.

55. The bone plate of claim 54, wherein the plurality of holes of the first type are located closer to a first end of the plate and the plurality of holes of the second type are located closer to a second end of the plate.

56. The bone plate of claim 53, wherein the longitudinal axis of at least one of the first type of hole is substantially aligned with the longitudinal axis of the plate.

57. The bone plate of claim 53, wherein the second type of hole has an outer perimeter that is substantially circular.

58. The bone plate of claim 57, wherein the ramp surface is located on one end of the elongated first type of hole to provide compression in a single direction.

59. The bone plate of claim 57, wherein the second type of hole is conically tapered inward from the upper surface towards the lower surface of the plate.

60. The bone plate of claim 59, wherein the second type of hole conically tapers at a cone angle of between about 5° and about 20°.

61. The bone plate of claim 59, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole is substantially non-threaded.

62. The bone plate of claim 61, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a plurality of holes of at least the second type are located closer to a second end of the plate.

63. The bone plate of claim 57, wherein the second type of hole has a first opening on the upper surface of the bone plate and a second opening on the bottom surface of the bone plate, and the first and second openings have substantially the same dimensions.

64. The bone plate of claim 63, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole is substantially non-threaded.

65. The bone plate of claim 64, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a plurality of holes of at least the second type are located closer to a second end of the plate.

66. A bone plate having a longitudinal axis and comprising:

an upper surface;

a lower surface;

at least one first type of hole extending through the upper and lower surfaces, and having a first central axis and being elongated in a direction substantially aligned with the longitudinal axis, wherein the first type of hole is non-threaded and has an outer perimeter, at least a portion of the outer perimeter tapering inward from the upper surface to the lower surface to form at least one ramp surface for engagement with a first screw head; and

at least a second type of elongated hole extending through the upper and lower surfaces, the second type of hole having a second central axis and a longitudinal axis, wherein the second type of hole includes a threaded portion and a non-threaded portion, and the threaded portion extends through an angle of between about 190° and about 280° with respect to the second central axis.

67. The bone plate of claim 66, wherein the plate comprises a plurality of holes of the first type and a plurality of holes of the second type.

68. The bone plate of claim 66, wherein the longitudinal axis of the second type of hole is substantially aligned with the longitudinal axis of the plate.

69. The bone plate of claim 66, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole is substantially non-threaded.

70. The bone plate of claim 69, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a plurality of holes of at least the second type are located closer to a second end of the plate.

71. The bone plate of claim 66, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole includes an internal thread configured and dimensioned for engaging a threaded portion of a screw head.

72. The bone plate of claim 71, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a plurality of holes of at least the third type are located closer to a second end of the plate.

73. The bone plate of claim 66, wherein the threaded portion of the second type of hole extends through an angle of between about 200° and about 250° with respect to the central axis.

74. The bone plate of claim 66, wherein:

the threaded portion of the second type of hole extends through a first angle at the upper surface;

the threaded portion of the second type of hole extends through a second angle at the lower surface; and

the first angle is larger than the second angle.

75. The bone plate of claim 74, wherein the first angle is between about 200° and about 270°, and the second angle is between about 180° and about 230°.

76. The bone plate of claim 66, wherein the second type of hole has first and second ends spaced apart along the longitudinal axis, and the threaded portion is disposed adjacent one of the ends.

77. The bone plate of claim 66, wherein the threaded portion of the second type of hole is located closer to a central portion of the bone plate than to an end portion of the bone plate.

78. The bone plate of claim 66, wherein the non-threaded portion of the second type of hole is configured and dimensioned to engage a substantially spherical screw head and provide compression of fractured bone fragments.

5 79. The bone plate of claim 78, further including a screw having a head, wherein the screw head is substantially smooth.

80. The bone plate of claim 78, further including a screw having a head, wherein the screw head is at least partially threaded.

81. The bone plate of claim 66, wherein the non-threaded portion of the second type of hole includes a concave recessed portion in the upper surface.

10 82. The bone plate of claim 81, wherein the recessed portion is substantially spherical.

83. The bone plate of claim 66, wherein:

the second type of hole has a first dimension on the lower surface that is substantially parallel to the longitudinal axis;

15 the second type of hole has a second dimension on the lower surface that is substantially perpendicular to the longitudinal axis; and

the first dimension is between 1.1 and 3 times larger than the second dimension.

84. The bone plate of claim 66, wherein the threaded portion of the second type of hole tapers inward in a direction from the upper surface towards the lower surface.

20 85. The bone plate of claim 84, wherein the threaded portion of the second type of hole conically tapers at a cone angle of between about 5° and about 20°.

86. The bone plate of claim 66, wherein the first central axis of the first type of hole is located closer to a first end of the bone plate and the second central axis of the second type of hole is located closer to a second end of the bone plate.

25 87. The bone plate of claim 66, wherein at least a portion of the non-threaded portion of the second type of hole tapers inward from the upper surface to the lower surface to form at least one ramp surface for engagement with a screw head.

88. The bone plate of claim 87, wherein the ramp surface is located on one end of the second type of hole to provide compression in a single direction.

89. A bone plate having a longitudinal axis and comprising:

an upper surface;

5 a lower surface; and

at least one first type of hole, the first type of hole being elongated and extending through the upper and lower surfaces, and having a central axis a longitudinal axis, wherein the first type of hole is at least partially threaded and the threaded portion of the hole tapers inward with respect to the central axis; and

10 at least a second type of hole extending through the upper and lower surfaces, the second type of hole including an internal thread configured and dimensioned for engaging a threaded portion of a screw head.

90. The bone plate of claim 89, wherein the plate comprises a plurality of holes of the first type and a plurality of holes of the second type.

15 91. The bone plate of claim 90, wherein the plurality of holes of the first type are located closer to a first end of the plate and the plurality of holes of the second type are located closer to a second end of the plate.

92. The bone plate of claim 89, wherein the longitudinal axis of at least one of the first type of hole is substantially aligned with the longitudinal axis of the plate.

20 93. The bone plate of claim 89, wherein the second type of hole has an outer perimeter that is substantially circular.

94. The bone plate of claim 93, wherein the second type of hole is conically tapered inward from the upper surface towards the lower surface of the plate.

25 95. The bone plate of claim 94, wherein the second type of hole conically tapers at a cone angle of between about 5° and about 20°.

96. The bone plate of claim 93, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole is substantially non-threaded.

97. The bone plate of claim 93, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a plurality of holes of at least the second type are located closer to a second end of the plate.

98. The bone plate of claim 93, wherein the second type of hole has a first opening on the upper surface of the bone plate and a second opening on the bottom surface of the bone plate, and the first and second openings have substantially the same dimensions.

99. The bone plate of claim 98, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole is substantially non-threaded.

100. The bone plate of claim 99, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a plurality of holes of at least the second type are located closer to a second end of the plate.

101. The bone plate of claim 89, wherein the threaded portion of the first type of hole extends through an angle of between about 200° and about 250° with respect to the central axis.

102. The bone plate of claim 89, wherein:

the threaded portion of the first type of hole extends through a first angle at the upper surface;

the threaded portion of the first type of hole extends through a second angle at the lower surface; and

the first angle is larger than the second angle.

103. The bone plate of claim 102, wherein the first angle is between about 200° and about 270°, and the second angle is between about 180° and about 230°.

104. The bone plate of claim 89, wherein the first type of hole has first and second ends spaced apart along the longitudinal axis, and the threaded portion is disposed adjacent one of the ends.

105. The bone plate of claim 89, wherein the threaded portion of the first type of hole is located closer to a central portion of the bone plate than to an end portion of the bone plate.

106. The bone plate of claim 89, wherein the first type of hole has a non-threaded portion.

107. The bone plate of claim 106, wherein at least a portion of the non-threaded portion of the first type of hole tapers inward from the upper surface to the lower surface to form at least one ramp surface for engagement with a screw head.

5 108. The bone plate of claim 107, wherein the ramp surface is located on one end of the first type of hole to provide compression in a single direction.

109. The bone plate of claim 106, wherein the non-threaded portion of the first type of hole is configured and dimensioned to engage a substantially spherical screw head and provide compression of fractured bone fragments.

10 110. The bone plate of claim 109, further including a screw having a head, wherein the screw head is substantially smooth.

111. The bone plate of claim 109, further including a screw having a head, wherein the screw head is at least partially threaded.

112. The bone plate of claim 106, wherein the non-threaded portion of the first type of
15 hole includes a concave recessed portion in the upper surface.

113. The bone plate of claim 112, wherein the recessed portion is substantially spherical.

114. The bone plate of claim 89, wherein:

the first type of hole has a first dimension on the lower surface that is substantially parallel to the longitudinal axis;

20 the first type of hole has a second dimension on the lower surface that is substantially perpendicular to the longitudinal axis; and

the first dimension is between 1.1 and 3 times larger than the second dimension.

115. A bone plate having a longitudinal axis and comprising:

25 an upper surface;

a lower surface; and

at least one first type of hole, the first type of hole being elongated and extending through the upper and lower surfaces, and having a central axis and a longitudinal axis, wherein the first type of hole is at least partially threaded and the threaded portion of the hole tapers inward with respect to the central axis; and

5 at least a second type of hole extending through the upper and lower surfaces, wherein the second type of hole is substantially non-threaded.

116. The bone plate of claim 115, wherein the plate comprises a plurality of holes of the first type and a plurality of holes of the second type.

117. The bone plate of claim 116, wherein the plurality of holes of the first type are
10 located closer to a first end of the plate and the plurality of holes of the second type are located closer to a second end of the plate.

118. The bone plate of claim 115, wherein the longitudinal axis of at least one of the first type of hole is substantially aligned with the longitudinal axis of the plate.

119. The bone plate of claim 115, wherein the second type of hole has an outer perimeter
15 that is substantially circular.

120. The bone plate of claim 119, wherein the second type of hole is conically tapered inward from the upper surface towards the lower surface of the plate.

121. The bone plate of claim 120, wherein the second type of hole conically tapers at a cone angle of between about 5° and about 20°.

20 122. The bone plate of claim 121, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole includes an internal thread configured and dimensioned for engaging a threaded portion of a screw head.

123. The bone plate of claim 122, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a
25 plurality of holes of at least the third type are located closer to a second end of the plate.

124. The bone plate of claim 119, wherein the second type of hole has a first opening on the upper surface of the bone plate and a second opening on the bottom surface of the bone plate, and the first and second openings have substantially the same dimensions.

5 125. The bone plate of claim 124, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole includes an internal thread configured and dimensioned for engaging a threaded portion of a screw head.

126. The bone plate of claim 125, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a plurality of holes of at least the third type are located closer to a second end of the plate.

10 127. The bone plate of claim 115, wherein the threaded portion of the first type of hole extends through an angle of between about 200° and about 250° with respect to the central axis.

128. The bone plate of claim 115, wherein:

15 the threaded portion of the first type of hole extends through a first angle at the upper surface;

the threaded portion of the first type of hole extends through a second angle at the lower surface; and

the first angle is larger than the second angle.

20 129. The bone plate of claim 128, wherein the first angle is between about 200° and about 270°, and the second angle is between about 180° and about 230°.

130. The bone plate of claim 115, wherein the first type of hole has first and second ends spaced apart along the longitudinal axis, and the threaded portion is disposed adjacent one of the ends.

25 131. The bone plate of claim 115, wherein the threaded portion of the first type of hole is located closer to a central portion of the bone plate than to an end portion of the bone plate.

132. The bone plate of claim 115, wherein the first type of hole has a non-threaded portion.

133. The bone plate of claim 132, wherein at least a portion of the non-threaded portion of the first type of hole tapers inward from the upper surface to the lower surface to form at least one ramp surface for engagement with a screw head.

5 134. The bone plate of claim 133, wherein the ramp surface is located on one end of the first type of hole to provide compression in a single direction.

135. The bone plate of claim 132, wherein the non-threaded portion of the first type of hole is configured and dimensioned to engage a substantially spherical screw head and provide compression of fractured bone fragments.

10 136. The bone plate of claim 135, further including a screw having a head, wherein the screw head is substantially smooth.

137. The bone plate of claim 135, further including a screw having a head, wherein the screw head is at least partially threaded.

138. The bone plate of claim 132, wherein the non-threaded portion of the first type of hole includes a concave recessed portion in the upper surface.

15 139. The bone plate of claim 138, wherein the recessed portion is substantially spherical.

140. The bone plate of claim 115, wherein:

the first type of hole has a first dimension on the lower surface that is substantially parallel to the longitudinal axis;

20 the first type of hole has a second dimension on the lower surface that is substantially perpendicular to the longitudinal axis; and

the first dimension is between 1.1 and 3 times larger than the second dimension.

141. A bone plate having a longitudinal axis and comprising:

25 an upper surface;

a lower surface;

at least one first type of hole extending through the upper and lower surfaces, and having a first central axis and being elongated in a direction substantially aligned with the longitudinal axis, wherein the first type of hole is non-threaded and has an outer

perimeter, at least a portion of the outer perimeter tapering inward from the upper surface to the lower surface to form at least one ramp surface for engagement with a first screw head; and

- 5 at least a second type of elongated hole extending through the upper and lower surfaces, the second type of hole having a second central axis and a longitudinal axis, wherein the hole is at least partially threaded and the threaded portion of the hole tapers inward with respect to the second central axis.

142. The bone plate of claim 141, wherein the plate comprises a plurality of holes of the first type and a plurality of holes of the second type.

- 10 143. The bone plate of claim 141, wherein the longitudinal axis of the second type of hole is substantially aligned with the longitudinal axis of the plate.

144. The bone plate of claim 141, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole is substantially non-threaded.

- 15 145. The bone plate of claim 144, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a plurality of holes of at least the second type are located closer to a second end of the plate.

146. The bone plate of claim 141, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole includes an internal
20 thread configured and dimensioned for engaging a threaded portion of a screw head.

147. The bone plate of claim 146, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a plurality of holes of at least the third type are located closer to a second end of the plate.

148. The bone plate of claim 141, wherein the threaded portion of the second type of hole
25 extends through an angle of between about 200° and about 250° with respect to the central axis.

149. The bone plate of claim 141, wherein:

the threaded portion of the second type of hole extends through a first angle at the upper surface;

the threaded portion of the second type of hole extends through a second angle at the lower surface; and

5 the first angle is larger than the second angle.

150. The bone plate of claim 149, wherein the first angle is between about 200° and about 270°, and the second angle is between about 180° and about 230°.

151. The bone plate of claim 141, wherein the second type of hole has first and second ends spaced apart along the longitudinal axis, and the threaded portion is disposed adjacent
10 one of the ends.

152. The bone plate of claim 141, wherein the threaded portion of the second type of hole is located closer to a central portion of the bone plate than to an end portion of the bone plate.

153. The bone plate of claim 141, wherein the second type of hole has a non-threaded
15 portion.

154. The bone plate of claim 141, wherein at least a portion of the non-threaded portion of the second type of hole tapers inward from the upper surface to the lower surface to form at least one ramp surface for engagement with a screw head.

155. The bone plate of claim 154, wherein the ramp surface is located on one end of the
20 second type of hole to provide compression in a single direction.

156. The bone plate of claim 153, wherein the non-threaded portion of the second type of hole is configured and dimensioned to engage a substantially spherical screw head and provide compression of fractured bone fragments.

157. The bone plate of claim 156, further including a screw having a head, wherein the
25 screw head is substantially smooth.

158. The bone plate of claim 156, further including a screw having a head, wherein the screw head is at least partially threaded.

159. The bone plate of claim 153, wherein the non-threaded portion of the second type of hole includes a concave recessed portion in the upper surface.

160. The bone plate of claim 159, wherein the recessed portion is substantially spherical.

161. The bone plate of claim 141, wherein:

5 the second type of hole has a first dimension on the lower surface that is substantially parallel to the longitudinal axis;

 the second type of hole has a second dimension on the lower surface that is substantially perpendicular to the longitudinal axis; and

10 the first dimension is between 1.1 and 3 times larger than the second dimension.

162. The bone plate of claim 141, wherein the threaded portion of the second type of hole conically tapers at a cone angle of between about 5° and about 20°.

163. The bone plate of claim 141, wherein the first central axis of the first type of hole is located closer to a first end of the bone plate and the second central axis of the second type of hole is located closer to a second end of the bone plate.

164. A bone plate defining a longitudinal axis and comprising:

 an upper surface;

 a lower surface;

20 at least one first type of hole, the first type of hole being elongated and extending through the upper and lower surfaces, and defining a central axis and a longitudinal axis, wherein the first type of hole is non-threaded and defines an outer perimeter, at least a portion of the outer perimeter tapering inward from the upper surface to the lower surface to form at least one ramp surface for engagement with a first screw head; and

25 at least a second type of hole extending through the upper and lower surfaces, wherein the second type of hole is substantially non-threaded.

165. The bone plate of claim 164, wherein the plate comprises a plurality of holes of the first type and a plurality of holes of the second type.

166. The bone plate of claim 165, wherein the plurality of holes of the first type are located closer to a first end of the plate and the plurality of holes of the second type are located closer to a second end of the plate.

5 167. The bone plate of claim 164, wherein the longitudinal axis of the first type of hole is substantially aligned with the longitudinal axis of the plate.

168. The bone plate of claim 164, wherein the second type of hole defines an outer perimeter that is substantially circular.

169. The bone plate of claim 168, wherein the ramp surface is located on one end of the elongated first type of hole to provide compression in a single direction.

10 170. The bone plate of claim 168, wherein the second type of hole is conically tapered inward from the upper surface towards the lower surface of the plate.

171. The bone plate of claim 170, wherein the second type of hole conically tapers at a cone angle of between about 5° and about 20°.

15 172. The bone plate of claim 170, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole includes an internal thread configured and dimensioned for engaging a threaded portion of a screw head.

173. The bone plate of claim 172, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a plurality of holes of at least the third type are located closer to a second end of the plate.

20 174. The bone plate of claim 168, wherein the second type of hole defines a first opening on the upper surface of the bone plate and a second opening on the bottom surface of the bone plate, and the first and second openings have substantially the same dimensions.

25 175. The bone plate of claim 174, further comprising at least a third type of hole extending through the upper and lower surfaces, wherein the third type of hole includes an internal thread configured and dimensioned for engaging a threaded portion of a screw head.

176. The bone plate of claim 175, wherein a plurality of holes of the first type and at least one hole of the second type or third type is located closer to a first end of the plate and a plurality of holes of at least the third type are located closer to a second end of the plate.